

Patent Claims

1. A method for operating a shelf in a commissioning system, with a shelf (1) and an associated storage and retrieval unit (2) for retrieving and introducing containers (3), trays or the like from or into the shelf, wherein a height area of the shelf (1), comprising a plurality of shelf levels (a, b, c, d) arranged one on top of another, can be operated as an independent shelf unit (I, II, III and IV) by means of at least one, mechanically coupled, longitudinally adjustable storage and retrieval unit (2), and at least two independent shelf units (I, II, III and IV) are provided,
5 characterized in that
said storage and retrieval unit (2) is transferred from one said shelf unit (I; II; III or IV) into an other shelf unit (II, III, IV or I, III, IV or I, II, IV or I, II, III) of said same shelf (1) or of another said shelf (1').
- 10 2. A method in accordance with claim 1,
characterized in that
said storage and retrieval unit (2) is transferred into another said shelf unit, which does not yet have a storage and retrieval unit of the same type.
- 15 3. A method in accordance with claim 1 or 2,
characterized in that
said storage and retrieval unit (2) is transported vertically from one said shelf unit into
another said shelf unit by means of a vertical elevator (4).
- 20 4. A method in accordance with one of the claims 1 through 3,
characterized in that

said storage and retrieval unit (2) is displaced horizontally from a shelf (1) to another said shelf (1') preferably in a height position (h) located at a spaced location from the bottom of said shelf on a horizontal path (6) between said shelves (1, 1').

5. A method in accordance with claim 5,

characterized in that

said horizontal path (6) is displaced vertically.

6. A method in accordance with one of the claims 1 through 5,

characterized in that

a storage and retrieval unit (2), which can be vertically extended, is brought into a
10 compact, flat, withdrawn position (K) before a transfer.

7. A method in accordance with one of the claims 1 through 6,

characterized in that

before a transfer, said storage and retrieval unit (2) is equipped with said containers (3) or trays, which are transferred together with said storage and retrieval unit and are
15 introduced into said other shelf unit after transfer of said storage and retrieval unit or are, conversely, released.

8. A method in accordance with one of the claims 1 through 6,

characterized in that

said storage and retrieval unit (2) is equipped with said containers (3) or trays in said other shelf unit after transfer, said containers (3) or trays to be introduced being transported by means of separate conveying means and being taken over by said storage and retrieval unit (2) for introduction into said other shelf unit or being, conversely, released in said other
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shelf unit only.

9. A storage and retrieval system for operating a shelf in a commissioning system in accordance with one of the claims 1 through 8, wherein a height area of the shelf (2), having a plurality of shelf levels (a, b, c, d) arranged one on top of another, can be operated as an independent shelf unit (I, II, III, IV) by means of at least one, mechanically coupled, longitudinally adjustable storage and retrieval unit (2), characterized in that a transferring device with at least one vertical elevator (4) is provided for transferring said storage and retrieval unit (2) from one said shelf unit (I, II, III, IV) into a other shelf unit (II, III, IV or I, III, IV or I, II, IV or I, II, III) of said same shelf (1) or of another said shelf (1').

10. A storage and retrieval system in accordance with claim 9, characterized in that said vertical elevator (4) is arranged in the area of one said longitudinal end of said shelf (1).

11. A storage and retrieval system in accordance with claim 9 or 10, characterized in that said vertical elevator (4) has holding and fixing means for a storage and retrieval unit (2), which is to be received and to be transferred vertically.

20 12. A storage and retrieval system in accordance with claim 10, characterized in that said vertical elevator (4) and/or each longitudinal end of each said shelf unit (I, II, III, IV)

facing said vertical elevator has locking means, which block a shelf unit (2) in relation to said vertical elevator (4) for safely receiving a storage and retrieval unit in said shelf unit when said vertical elevator is being operated in another height position.

13. A storage and retrieval system in accordance with one of the claims 9 through 12,
5 characterized in that
said vertical elevator (4) comprises a elevator cage (4') for receiving a storage and retrieval unit (2), which can be transferred vertically between at least two said shelf units (I, II, III, IV) arranged one on top of another and can be positioned at the level of said shelf units.
- 10 14. A storage and retrieval system in accordance with one of the claims 9 through 13,
characterized in that
at least one other transport elevator (5) is provided for separate transport for said containers (3) or trays, which is preferably located at a longitudinal end of said shelf (1).
- 15 15. A storage and retrieval system in accordance with one of the claims 9 through 14,
characterized in that
a horizontal path (6) is provided, on which said storage and retrieval unit (2) can be displaced horizontally between said shelves from one said shelf (1) to another said shelf (1'), preferably in a height position (h) located at a spaced location from said shelf bottom, or said horizontal path (6) can be transferred horizontally together with said storage and retrieval unit (2).
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16. A storage and retrieval system in accordance with claim 15,
characterized in that

said horizontal path (6) is adjustable in height.

17. A storage and retrieval system in accordance with one of the claims 9 through 16,
characterized in that

said storage and retrieval unit (2) has a lower and/or upper longitudinal chassis (12, 13),
5 which are displaceable along a shelf front in a nontilting manner in fixed horizontal rails
(10) in the levels of said shelf units (I, II, III, IV), said horizontal rails (10) being an
integrated part of said shelf.

18. A storage and retrieval system in accordance with claim 17,
characterized in that

10 said storage and retrieval unit (2) has a vertical mast (24) with an upper and lower chassis
(12, 13), wherein a height-adjustable load receiving means (7) for said containers (3) or
trays is provided along said vertical mast (24).

19. A storage and retrieval system in accordance with claim 18,
characterized in that

15 said vertical mast (24) has an articulated joint (20), which permits deflection of said mast
in the direction of the longitudinal displacement (L), said articulated joint being preferably
provided in the area of said upper chassis (12) of said storage and retrieval unit (2).

20. A storage and retrieval system in accordance with claim 18 or 19,
characterized in that

20 said vertical mast (24) extends over the height of a shelf unit (I, II, III, IV).

21. A storage and retrieval system in accordance with one of the claims 9 through 17,

characterized in that

a storage and retrieval unit (2), which can be vertically extended, is provided with a height-adjustable lifting table (6) and can be withdrawn into a compact, flat position (K) before a transfer, is provided.

Amended Patent Claims

1. A method for operating a shelf, preferably in a commissioning system, with a shelf (1) and an associated storage and retrieval unit (2) for retrieving and introducing containers (3), trays or the like from or into the shelf, wherein a height area of the shelf (1) having a plurality of shelf levels (a, b, c, d) arranged one on top of another can be operated as an independent shelf unit (I, II, III and IV) by means of at least one, mechanically coupled and longitudinally adjustable storage and retrieval unit (2), and at least two said independent shelf units (I, II, III and IV) are provided, characterized in that
- 10 the storage and retrieval unit (2) is transferred vertically from one said shelf unit (I; II; III or IV) into an other shelf unit (II, II, IV or I, III, IV or I, II, IV or I, II, III) of the said same shelf (1) or of another said shelf (1').
2. A method in accordance with claim 1, characterized in that
- 15 said storage and retrieval unit (2) is transferred into another said shelf unit, which does not yet have a storage and retrieval unit of the same type.
3. A method in accordance with claim 1 or 2, characterized in that said storage and retrieval unit (2) is transported vertically by means of a vertical elevator (4) from one said shelf unit into another said shelf unit.
- 20 4. A method in accordance with one of the claims 1 through 3, characterized in that

said storage and retrieval unit (2) is displaced horizontally from one said shelf (1) to another said shelf (1') preferably in a height position (h) located at a spaced location from the shelf bottom on a said horizontal path (6) between the shelves (1, 1').

5. A method in accordance with claim 5,

characterized in that

said horizontal path (6) is displaced vertically.

6. A method in accordance with one of the claims 1 through 5,

characterized in that

said storage and retrieval unit (2), which is vertically extensible, is brought into a compact, flat, withdrawn position (K) before transfer.

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7. A method in accordance with one of the claims 1 through 6,

characterized in that

before transfer, said storage and retrieval unit (2) is equipped with containers (3) or trays, which are transferred together with said storage and retrieval unit and are introduced or, conversely, released after transferring said storage and retrieval unit in the other shelf unit.

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8. A method in accordance with one of the claims 1 through 6,

characterized in that

said storage and retrieval unit (2) is equipped with containers (3) or trays in the other shelf unit after transfer, the containers (3) or trays to be introduced being transported by means of separate conveying means and being taken over by said storage and retrieval unit (2) for introduction into the other shelf unit or being, conversely, released in the other shelf unit only.

9. A storage and retrieval system for operating a said shelf, preferably in a said commissioning system, for carrying out the method in accordance with one of the claims 1 through 8, wherein a height area of the shelf (2) having a plurality of shelf levels (a, b, c, d) arranged one on top of another can be operated as an independent shelf unit (I, II, III, IV) by 5 means of at least one, mechanically coupled and longitudinally adjustable storage and retrieval unit (2),

characterized in that

a transferring device with at least one vertical elevator (4) is provided for transferring the storage and retrieval unit (2) from one said shelf unit (I, II, III or IV) into another said 10 shelf unit (II, III, IV or I, III, IV or I, II, IV or I, II, III) of the said same shelf (1) or of another said shelf (1').

10. A storage and retrieval system in accordance with claim 9,

characterized in that

said vertical elevator (4) is arranged in the area of one said longitudinal end of the shelf 15 (1).

11. A storage and retrieval system in accordance with claim 9 or 10,

characterized in that

said vertical elevator (4) has holding and fixing means for a storage and retrieval unit (2), which is to be received and to be vertically displaced.

20 12. A storage and retrieval system in accordance with claim 10,

characterized in that

said vertical elevator (4) and/or each longitudinal end of each said shelf unit (I, II, III, IV) facing the vertical elevator has locking means, which blocks a said shelf unit (2) in relation

to the vertical elevator (4) for safely receiving a storage and retrieval unit in the shelf unit when the vertical elevator is being operated in another height position.

13. A storage and retrieval system in accordance with one of the claims 9 through 12, characterized in that
5 said vertical elevator (4) comprises an elevator cage (4') for receiving a storage and retrieval unit (2), which can be displaced vertically between at least two said shelf units (I, II, III, IV) arranged one on top of another and can be positioned at the level of the shelf units.
14. A storage and retrieval system in accordance with one of the claims 9 through 13, characterized in that
10 at least one other transport elevator (5) is provided for the separate transport of containers (3) or trays, which is preferably located at one longitudinal end of the said shelf (1).
15. A storage and retrieval system in accordance with one of the claims 9 through 14, characterized in that
15 a horizontal path (6) is provided, on which the storage and retrieval unit (2) can be displaced horizontally between the shelves from one said shelf (1) to another said shelf (1') preferably in a height position (h) located at a spaced location from the shelf bottom or the horizontal path (6) can be displaced horizontally together with the storage and retrieval unit (2).
- 20 16. A storage and retrieval system in accordance with claim 15, characterized in that
 said horizontal path (6) is adjustable in height.

17. A storage and retrieval system in accordance with one of the claims 9 through 16,
characterized in that
said storage and retrieval unit (2) has a lower and/or upper longitudinal chassis (12, 13),
which are displaceable along a shelf front in a nontilting manner in fixed horizontal rails
5 (10) in the levels of the said shelf units (I, II, III, IV).

18. A storage and retrieval system in accordance with claim 17,
characterized in that
said storage and retrieval unit (2) has a vertical mast (24) with an upper and lower chassis
(12, 13), wherein a height-adjustable load receiving means (7) for containers (3) or trays is
10 provided along the vertical mast (24).

19. A storage and retrieval system in accordance with claim 18,
characterized in that
said vertical mast (24) has an articulated joint (20), which permits deflection of the mast in
the direction of longitudinal displacement (L), the articulated joint being preferably
15 provided in the area of the upper chassis (12) of the storage and retrieval unit (2).

20. A storage and retrieval system in accordance with claim 18 or 19,
characterized in that
said vertical mast (24) extends over the height of a shelf unit (I, II, III, IV).

21. A storage and retrieval system in accordance with one of the claims 9 through 17,
20 characterized in that
said storage and retrieval unit (2), which can be extended vertically, is provided with a

height-adjustable lifting table (6) and can be withdrawn into a compact, flat position (K) before a transfer, is provided.